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Status of fisheries and research carried out in Subarea 4 in 1973.

by

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Pertinent Documents

Reports on research were received from Canada, France, Fed. Rep. Germany, Japan, Poland, Portugal, Spain, USSR, UK, and USA. Summary Documents 5, 6, 8, 9, 11, 17, 25, 34 and Research Documents 9, 13, 15, 16, 18, 21, 22, 23, 24, 25, 30, 38, 39, 40, 41, 42, 45, 51, 52, 56, 57, 58, 59, 60, 61, 66, 67, 70, 72, 77, 87, 88, 91, 92, 93, 94, 95, 96, 102, 105, 115 report matters of interest to Panel 4.

1. Status of the Fisheries

Nominal catches of all species increased about 25% from 911,463 metric tons in 1972 to 1,139,076 tons in 1973, only slightly (3%) less than the catch in 1971.

Canadian catches remained at approximately the same level as they were in 1972 (600,000 tons). Increased catches were reported by France (21,000 to 29,000 tons), Fed. Rep. Germany (600 to 1600 tons), Japan (4500 to 5000 tons), Poland (400 to 1800 tons), Norway (0 to 700 tons), Portugal (13,000 to 17,000 tons) and USSR (200,000 to 423,000 tons). Decreased catches were reported by Denmark(F) (11,500 to 7,500 tons), German Democratic Republic (2000 to 0 tons), Spain (42,000 to 40,000 tons) and USA (15,000 to 14,000 tons).

Nominal catches of most major species either increased or remained at about the same level in 1973. Redfish catches increased from 130,000 to 170,000 tons, silver hake from 114,000 to 299,000 tons, mackerel from 21,000 to 36,000 tons, pollock from 20,000 to 30,000 tons, witch from 13,000 to 16,000 tons, and anglers from 3,000 to 10,000 tons. Catches of haddock (18,000 tons) were about the same as in 1972 as were the catches of American plaice (20,000 tons). Other species that showed little change included wolffish, yellowtail flounder, halibut,

red hake, white hake, alewives, dogfish, cusk, winter flounder, skates and salmon. Catches from the relatively recent squid fishery increased from 2,000 tons in 1972 to 9,000 tons in 1973. Species for which there were major decreases in nominal catch in 1973 included herring (259,000 to 233,000 tons, cod (209,000 to 188,000 tons), and argentines (6,000 to 2,000 tons).

2. Research Carried Out.

a) Canada. Assessment and inventory studies of groundfish and pelagic fish populations and statistics and sampling of commercial fisheries were continued. Combined acoustic and trawling surveys were carried out in Divisions 4VWX. Studies of the retention and survival of herring larvae in the Bay of Fundy during the winter months were continued and 12,147 juvenile herring were tagged in Div. 4X. A gear selectivity study on Iceland scallops was carried out. Vertical movements of salmon were investigated and tagging experiments continued. Environmental studies included temperatures, salinities, current measurements, chlorophyll concentrations, acoustic surveys and plankton ecology and physiology.

b) France. Seven (7) research vessel (R/V Cryos) cruises were carried out in Subareas 3, 4, and 5. Studies included size frequencies and age compositions of cod, herring. silver hake, American plaice and yellowtail flounder in Divisions 4RSVWX. Catch rates, species mixture, and size compositions of squid in Divisions 4VWX were investigated. Hydrographic studies and exploratory fishing were carried out in Divisions 4ST.

c) Poland. Plankton and hydrographic (temperatures, salinities and phosphates) studies were carried out in Division 4X. Research on squid (*Illex*) included measurement of 1109 specimens.

d) Spain. Cod sampling for size and age composition was carried out in February, March and December. A total of 4,813 cod were measured and 472 were aged and a report on by-catches was presented.

e) USSR. Research during 1973 included length and age composition studies of herring, argentines and silver hake, distribution studies of phytoplankton, zooplankton and ichthyoplankton as indicators of spawning areas and conditions for major commercial species; hydro-chemical studies in relation to ecological surveys and immuno-serological, biochemical and parasitological studies of herring and mackerel.

f) United Kingdom. Continuous plankton recorders were operated on the same basis as in other years. Sampling in Subarea 4 covered 2,173 miles in 1973. Monthly distributions of all species or species groups were plotted as mean numbers per statistical rectangle, standard area and ICNAF subarea.

g) Japan. Length measurements for main species caught by commercial trawlers were made on board.

h) Portugal. Catch and effort data were collected for gillnet and dory vessels and trawlers.

i) USA. Summary reports of food studies for cod, haddock and silver hake are in preparation. Spawning and fecundity studies for cod, haddock and pollock are continuing. Studies to determine if both juvenile and adult herring and mackerel compete for food were initiated. Environmental studies included surface temperatures and salinities and temperature profiles.

j) Fed.Rep. Germany. Cod selection experiments were carried out by the R/V *Walther Herwig* during April/May in Div. 4RTVn.

k) Special Studies. Cooperative and coordinated groundfish surveys were carried out by Canada, France, Poland, USSR and USA. Participation in ICNAF joint larval herring surveys included Canada, France, Fed. Rep. Germany, Poland, USSR and USA. Juvenile herring surveys were conducted partly in Subarea 4 by the Fed. Rep. Germany.

3. Hydrographic and plankton studies

Moored current meters and temperature recorders were used in studies of the generation of internal waves on the sloping bottom at the edge of the continental shelf.

Surface water temperatures on the Scotian Shelf were colder than usual and more saline.

Continuous plankton recorder surveys showed that copepods were unusually abundant in January and February. Young stages of redfish were well above normal in June.

Polish plankton studies in Subarea 4 indicated a plankton biomass exceeding 80 $cm^3/100\ m^3$ of water. The main components were copepods and euphausiids. There was a strong positive correlation between the high biomass of plankton and the occurrence of herring larvae.

4. Cod

Landings from the Div. 4T-Vn migrating cod stock decreased to about 51,000 tons in 1973 (68,000 tons in 1972). Recent catches have depended heavily on the good 1968 year-class which entered the fishery at age 4. More recent year-classes appear to be of average size and a declining population abundance is expected. To maintain $F = 0.45$ (approximately the level maximizing yield per recruit) implies catches of about 50,000 tons in 1975.

The fisheries for cod in Subdiv. 4Vn (May to December) are based on local inshore stocks and offshore (Div. 4Vs) stocks which migrate northwards to Subdiv. 4Vn in summer. There are no new data that would modify the analysis on which the original recommendation for management of these fisheries was made.

Cod landings from Div. 4VsW declined about 13% in 1973 to 53,800 tons. Earlier assumptions on the age composition of the stocks in this area were probably erroneous and improved sampling has now shown that considerably younger fish are included in the catches. This raises uncertainties about the current management objective of maintaining F at 0.45 which is associated with an annual catch of 60,000 tons. This figure may be too high but it will require several more years of improved data to adequately define an appropriate catch level.

The cod stock in Div. 4X has two components - inshore and offshore and tagging experiments have shown that there is little mixing between them. Landings (7,000 tons) from the offshore component were about the same in 1973 as they were in the previous year. The stock as a whole is overexploited and has declined seriously in abundance. In spite of lower catches in recent years, fishing mortality is considerably above the level which would give maximum yield-per-recruit. A fishing mortality rate of $F = 0.35$ (less than half the present rate) would provide for recovery of the stock to former levels.

5. Haddock

Under catch quota regulation (TAC equals 4,000 tons) haddock landings from Div. 4VW amounted to about 4,400 tons in 1973. This stock, which has sustained annual catches of 25,000 tons in the past is still severely depleted. Research vessel surveys indicate that mortality is high ($F = 0.70$ on age 5+ fish). Pre-recruit year-classes are poor and no immediate improvement in stock abundance is forseen.

Directed catches until closure of the fishery in early May and subsequent by-catches from the Div. 4X haddock stock amounted to 13,074 tons, about the same as in 1972. There are some indications of improvement in this stock. The 1969 year-class was stronger than those year-classes immediately preceding it. The 1971 year-class appears to be twice as strong as that of 1969 and the 1972 year-class is about equal to it. The 1970 year-class is considerably weaker than even the poor year-classes of 1964-68 and first indications are that the 1973 year-class is also weak. If recruitment continues at current levels, annual yields of about 15,000 tons can be sustained but there will be little increase in the residual stock by 1977. To rebuild the spawning stock towards the levels of the early 1960's annual catches less than 15,000 tons will be necessary.

6. Silver hake

Silver hake landings from Subarea 4 have fluctuated widely since the fishery began in 1961 apparently because of differences in recruitment. Landings in 1973 (299,000 tons) represent a sharp increase from the landings in 1972 (114,000 tons). The fishery is now exploiting several extremely large year-classes but there are uncertainties about recruitment levels and exploitation rates. Both USSR and Canadian research vessel surveys indicate that the 1972 year-class was strong and USSR data suggest that the 1973 year-class is weak. The USSR has the only major fishery for silver hake in Subarea 4 and USSR scientists have agreed to provide a detailed assessment of this stock at the next Annual Meeting.

7. Redfish

Landings of redfish from Div. 4VWX amounted to about 40,000 tons in 1973. Landings from these areas have fluctuated widely from 9,700 tons in 1955 to 62,000 tons in 1971 without apparent trend. Average annual landings from 1969-71 inclusive were 30,000 tons.

Both commercial catch rates and research vessel surveys indicate slight declines in abundance in 1973. Length-frequency data from commercial and research vessel catches suggest that catches in recent years have been sustained either by a single good year-class or by several adjacent good year-classes entering the fishery. This group of fish is now essentially fully recruited to the fishery and there is no indication at present of any substantial new recruitment (few fish less than 20 cm were included in research vessel catches). It is unlikely, therefore, that current catch levels can be maintained and decreasing catches and catch rates must be anticipated for the next few years.

In Div. 4RST redfish catches increased 62% to slightly more than 130,000 tons chiefly as a consequence of the diversion of effort from other fisheries. The catch in 1973 was heavily dependent on the 1956 and 1958 year-classes. Prospects for new recruitment in the near future are poor.

8. Mackerel

Mackerel catches in Div. 4VWX in 1973 totalled 25,700 tons, a 97% increase over the 1973 catch (in Subarea 3 the 1973 catch was 2200 tons, an increase of 39% over 1972 catch).

Biological, catch, and tagging data (Res.Doc. 74/8, 9, 94, 102) indicate that growth parameters and age compositions are similar between Subareas 3-6 and that intermixing of the two contingents occurs during the winter fishery in Subarea 5 and Statistical Area 6. The TAC appropriate to the situation and its allocation

to Subareas depends on the degree of this mixing, which is not known at the present time.

In the circumstances it might be most appropriate to include all mackerel within a single assessment, but having regard for the already existing uncertainties for Subarea 5 and Statistical Area 6, the Subcommittee concluded that such an assessment was not possible at this meeting but strongly recommends it to be carried out for the 1975 Annual Meeting. Recognizing therefore that mackerel in Subareas 3 and 4 might be exposed to some additional risk, the Subcommittee recommended that, for 1975, a TAC of 70,000 tons be established to apply to all mackerel in Subareas 3 and 4 (55,000 tons for 4VWX and 15,000 tons estimated to be the 1974 catch in Div. 4RST and Subarea 3).

9. Pollock

Pollock catches from Subareas 4 and 5 amounted to 43,000 tons in 1973, an increase of 10,000 tons (30%) over the catch in 1972.

The identity of pollock stocks in the ICNAF area is not known. It is possible that there is a single stock in Div. 4VWX and Subarea 5, and it has been assessed as such. The recommended total allowable catch (TAC) by the Assessments Subcommittee is based on examinations of catches and catch per unit of effort from the commercial fishery along with catches made during research vessel cruises. These data indicate that the population is not declining under current catch levels and it is considered desirable to maintain the catch at its present level until the effect of more prolonged fishing can be evaluated.

10. Herring

Information on herring considered at this meeting is too voluminous to be reviewed in detail. However, most of the pertinent data is summarized in the reports of the Herring Working Group (Summ.Doc. 74/8; Proc. No. 1, Appendix I, Annex 1, p. 48).

Assessment of the 4T herring stock complex during the period 1958-73 indicated that the recent drastic decline in the herring catches in the southern Gulf of St. Lawrence (4T) has been largely due to a succession of poor year-classes since the late 1950's. On the basis of this assessment, the 1973 mobile fleet catches in 4T were placed under Canadian domestic quota regulations (23,000 tons) with an additional catch of 20,000 tons for fixed gears. In 1974 similar regulations have been instituted with a mobile fleet quota of 20,000 tons (additional estimated fixed gear catch of 25,000 tons).

Assessment of the 4VWa stock complex was not available. However, a report on the 1973-74 fishery and catch per unit effort data indicated a decline in adult abundance in Subdivision 4Va, formerly an old fish fishery. Despite the presence of a large 1970 year-class in

Subdiv. 4Vn and 4W(a), the fisheries in both areas are now dependent on young fish and the exploitation of these fish should not be increased. The Assessments Subcommittee, therefore, recommended that the TAC for Div. 4VW(a) in 1975 not exceed 45,000 tons.

An assessment was available for the 4XWb stock complex. It was necessary to make assumptions on the size of the 1970-73 year-classes since juvenile surveys do not as yet give reliable estimates of year-class strength. The 1970 year-class, on which the fishery is dependent was assumed to be twice as large as the 1966 year-class as implied by Canadian catch per unit effort data. Unless the 1971-73 year-classes are substantially larger than assumed, the fishery will have to rely on the 1970 year-class through 1976. Thus, although the assessment indicates an acceptable TAC of 90,000 tons for 1975, a lower TAC is recommended to protect the 1976 fishery.

A tagging experiment was conducted in November and December 1973 at Grand Manan Island in the Bay of Fundy. Returns to May 1974 indicate movement outside of the Bay was minimal over the winter.

11. Flatfish

Total landings of all flatfish species amounted to 47,500 tons in 1973. This represents an increase of 17% over the landings in 1972 and continues the upward trend in catches which began in 1960. Canada took more than 70% of the catch in 1973 and USSR most of the remainder. American plaice is widely distributed throughout Subarea 4 but most of the offshore catch is made in Divisions 4VsW in the cold water area north of Banquereau. Winter flounder is mainly a coastal species although substantial catches are made in relatively shallow waters near Sable Island (Division 4W). Most of the witch catches outside the Gulf of St. Lawrence are made in deep water (>100 fms) in Divisions 4VsW. Yellowtail are also caught in Divisions 4VsW but usually in depths less than 50 fathoms.

For Scotian Shelf stocks (Div. 4VWX) catch rates of flounders by Canadian trawlers continued to decline in 1973 as they have since 1965, abundance estimates from research vessel surveys showed no change over the period 1970-73. The 1972 assessments indicated that American plaice and witch stocks were almost fully exploited while yellowtail had been overexploited and had declined substantially in abundance. Uncertainties in species breakdown does not permit separate management regimes (for these species) although errors in the estimated yield levels will largely balance out when assessments are combined. A total allowable catch (TAC) of 32,000 tons is considered to be close to the maximum yield-per-recruit and it is recommended that the TAC of 1975 be set at this level.

Canadian research results showed differences in diet and parasites for American plaice which are associated with fish size and locality. Results confirm that the Division 4T stock is distinct from the stocks in Divisions 4VWX.

12. Argentines

Landings of argentines from Div. 4VWX declined from 5,868 tons in 1972 to 1,467 tons in 1973. The total allowable catch (TAC) for 1974 was set at 25,000 tons which is considered to be above the long-term sustainable yield but reflects the development of the fishery as the accumulated biomass is harvested. No new information is available for argentines in Subarea 4 and hence there is no change in advice for management of this fishery.

13. Squid

Commercial catches of squid (Illex) in Subarea 4 increased from 2,000 tons in 1973 to 9,000 tons in 1974, but are taken incidentally to directed fisheries for other species. Studies based on the amount of Illex consumed by pilot whales (Res.Doc. 74/49) suggest that the potential catch could be substantial, but this cannot be quantified at this time and no advice of an appropriate TAC for 1975 can be given.